

Sapphire Optical Fiber Sensors for Structural Performance Testing up to 3000 F, Phase I

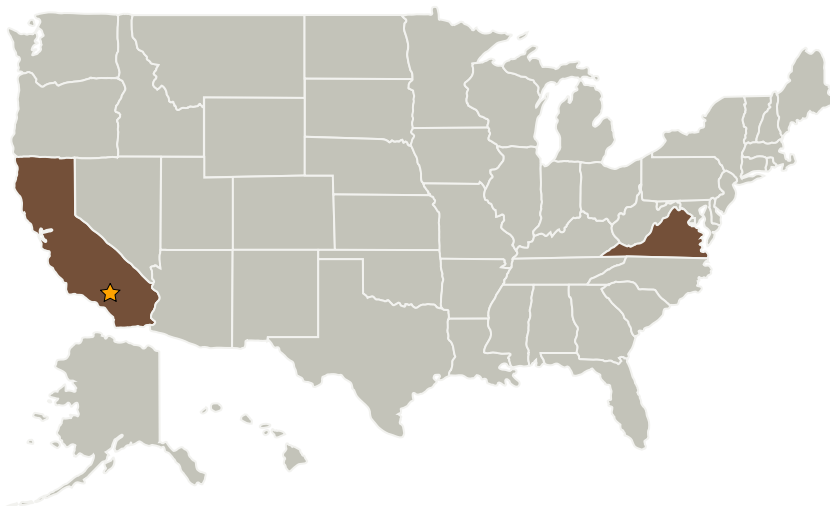
Completed Technology Project (2004 - 2004)



Project Introduction

The development and performance evaluation of new carbon/carbon (C/C) and carbon/silicon-carbide (SiC) composite structural components has been hampered by the lack of reliable strain sensors that can survive up to the exceedingly high temperatures (3000 F) up to which these materials must be tested. Existing off-the-shelf high-temperature strain sensors, including free filament electrical strain gages and optical fiber based strain sensors, currently do not have the necessary performance characteristics to tackle the next generation of C/C and SiC composite material testing programs. Free filament electrical strain gages cannot be used reliably over 1800 F (1000 C) and conventional optical fiber strain sensors with the appropriate protective metal coatings can operate reliably only up to close to the melting point of the silica (2000 F/1100 C). To meet the growing needs for strain sensors that can withstand future high temperature testing regimes, Lambda Instruments, Inc. proposes to develop sapphire optical fiber sensors. The 3600 F (1987 C) melting temperature of optical quality sapphire fibers, their low profile geometry, and the inherent immunity of optical fiber sensors to electromagnetic interference make sapphire fiber-based sensors particularly well suited for the proposed application.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Armstrong Flight Research Center (AFRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California
Lambda Instruments, Inc.	Supporting Organization	Industry	Blacksburg, Virginia

Primary U.S. Work Locations

California	Virginia
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jon Greene

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.3 Thermal Protection Components and Systems
 - └ TX14.3.5 Thermal Protection System Instrumentation